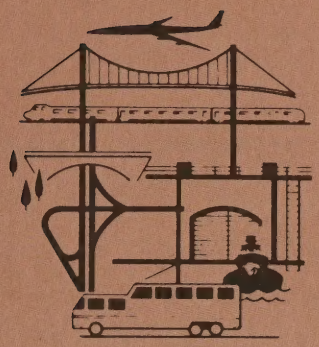
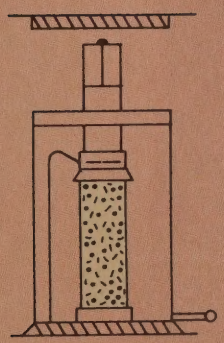
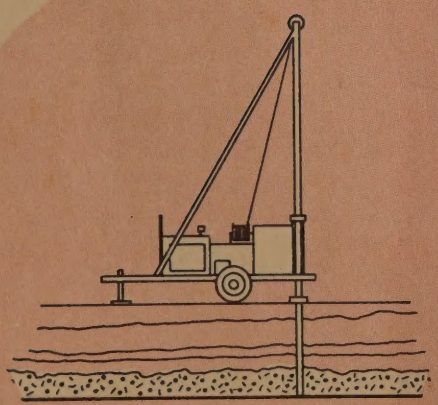
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOIL MECHANICS BUREAU



CASE STUDY
FEBRUARY, 1992





SUBJECT: 36 INCH CAISSON INSTALLATION
AT BASCULE PIERS

PROJECT: GREENPOINT AVENUE BRIDGE
OVER NEWTOWN CREEK
KINGS AND QUEENS COUNTIES
PIN 0751.65.301
CONTRACT NO. D500026

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU

36 INCH DIAMETER CAISSON INSTALLATION
CASE HISTORY

PIN 0751.65.301
GREENPOINT AVENUE BRIDGE
OVER NEWTOWN CREEK
KINGS AND QUEENS COUNTIES

BY
ROBERT G. STROHMAIER
ASSISTANT SOILS ENGINEER
JANUARY, 1992

CONTENTS

	Page
Abstract	1
Project Description	2
Project Location Map	3
Foundation Conditions	4
Subsurface Profile and Legend	5
Sketch Showing Construction Stages	6
Caisson Installation Procedure Stage I	7 & 8
Caisson Installation Procedure Stage IV	9 & 10
Conclusions	11 & 12
Appendix	
Caisson Specifications	A1 - A3
Rock Coring Specifications	A4 - A5
Bid Price Sheets	A6 - A12
Photos	A13 - A17

NYSDOT
Library
50 Wolf Road, POD 34
Albany, New York 12232

ABSTRACT

This report describes the design and construction procedures used to construct the two bascule piers for the Greenpoint Avenue bridge over the Newtown Creek in New York City.

The bascule piers were supported on eighty-eight, 90 feet long, 36 inches in diameter steel caissons, with 1 inch thick walls.

Due to Maintenance and Protection of Traffic concerns, this Contract was phased and divided into five separate stages. The actual caisson installations for the bascules piers were performed by different contractors in Stage I and Stage IV.

Construction problems and recommendations related to the caisson installation procedure are discussed in this report.

PROJECT DESCRIPTION

The project consists of a bridge replacement over Newtown Creek which separates the Boroughs of Queens and Brooklyn (Fig. 1). The total length of the structure is 1010 feet, and is supported on two standard abutments, seven hammerhead piers and two bascule piers. The abutments and hammerhead piers are supported on steel H-piles driven to practical refusal.

The bascule span is comprised of two equal sections 104 ft long for a total length of 208 ft. Each bascule section weighs approximately 375 tons and is designed to be raised and lowered by mechanical means employing counterweights and four 100 horsepower motors. Each bascule pier is supported on 36 inch diameter by 1 inch thick by 90 feet long, steel caissons seated at least six inches into rock. Thirty inch rock sockets were installed a minimum of four feet into sound rock. A total of 88 caissons were installed for these piers. A 14 foot thick tremie seal was necessary at both bascule locations to counteract the hydrostatic head developed at the proposed footing elevations.

This structure was constructed in five stages (Stage I through Stage V) primarily as a means to maintain traffic flow. In Stage I, the south section of the new structure was completed while traffic was maintained on the existing structure. In Stage IV, the original structure was then demolished while traffic was maintained on the south section of the new structure. The north side of the structure was then constructed. All caissons used for this structure were installed in Stage I and IV.

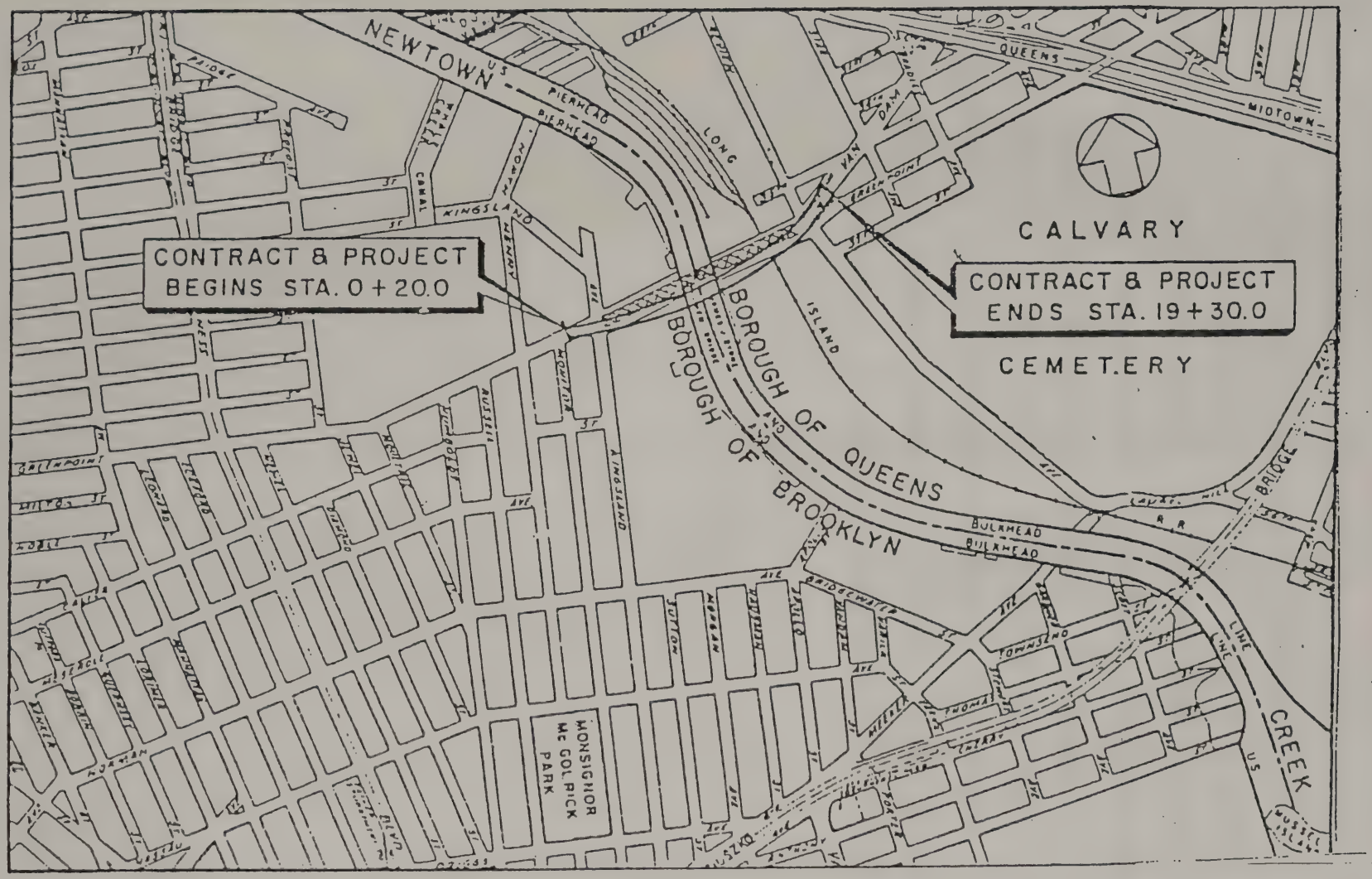
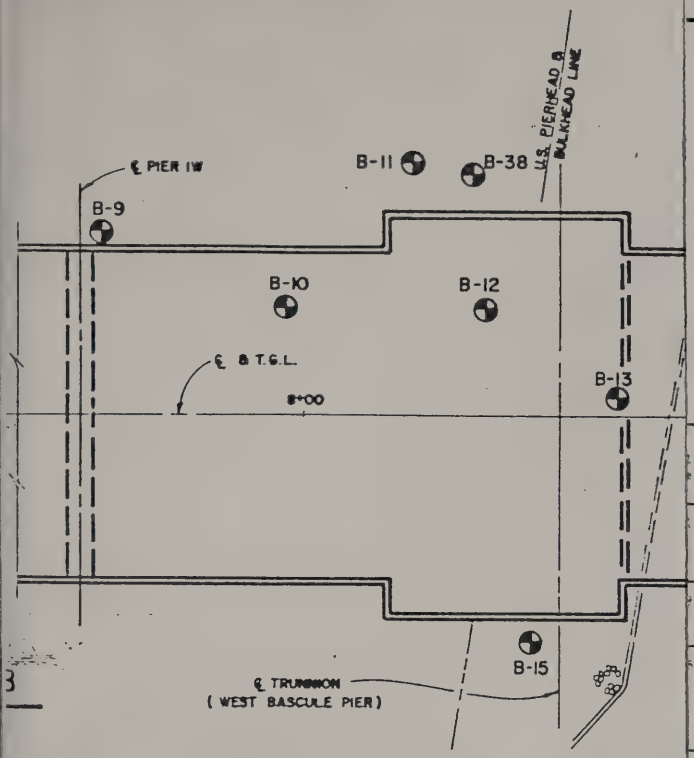


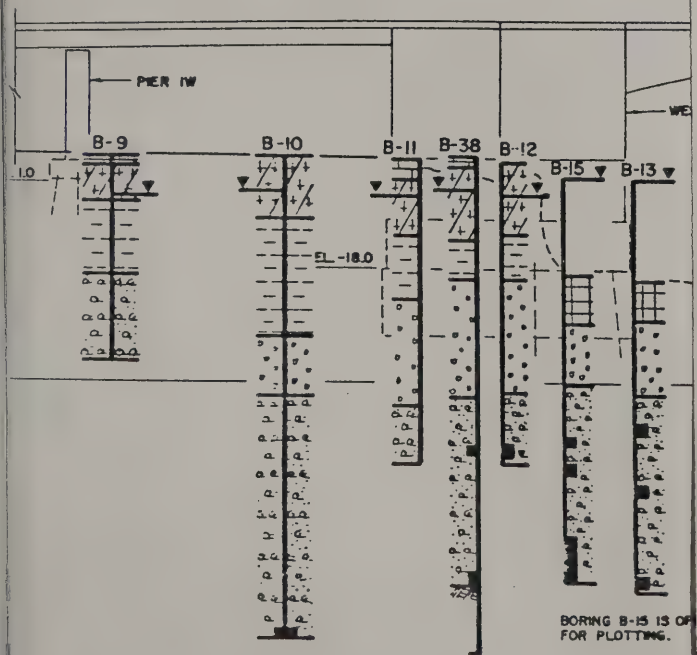
FIG 1

PROJECT LOCATION MAP

FOUNDATION CONDITIONS

The subsurface conditions are shown in Figure 2. In general, the site conditions in the area of the bascule piers consisted of a 12 to 16 foot layer of fill material described as Compact Brown Gravelly SAND overlying a 7 to 9 foot thick layer of Very Soft Black MUCK, changing to 10 to 15 feet of Soft Grey Organic SILT and Shells. Underlaying this was 40 to 50 feet of Medium Compact to Very Compact Brown Sandy SILT, Gravelly with occasional Boulders underlain by Ledgerock which in this area was described as an unweathered gneiss. Engineering Geologists from the Soil Mechanics Bureau recommended an allowable bearing capacity of 60 TSF in the rock, and an allowable side resistance of 6 TSF for each foot of rock socket depth.





FED RD REG NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
	NEW YORK			

GREENPOINT AVENUE BRIDGE

CAPITAL PROJECT IDENTIFICATION NUMBER: 0751.65

LABORATORY GRAIN SIZE DISTRIBUTION TEST SUMMARY

ll	Representative Sample Depth - Feet	% Passing By Weight U.S. Std. Sieve Size								
		2"	1"	1/2"	1/4"	#10	#20	#40	#100	#200
	10-11.5	100.0	86.3	[illegible]	[illegible]	66.9	57.4	[illegible]	27.3	18.7
	31-32.0	100.0	95.0	[illegible]	83.7	75.9	65.2	[illegible]	14.5	8.0
	41-42.0					100.0	99.9	[illegible]	99.6	99.2
	52-53.5			[illegible]	[illegible]	95.6	89.7	[illegible]	31.9	14.4
	20-21.5			[illegible]	[illegible]	69.7	47.9	26.3	6.4	2.1
	26-37.5					100.0	100.0	99.9	99.8	99.5
	52-53.5				[illegible]	97.8	73.7	[illegible]	6.3	2.1
	16-17.5		100.0	[illegible]	[illegible]	85.8	[illegible]	[illegible]	17.9	12.5
	26-27.5	61.7	-	[illegible]	[illegible]	[illegible]	44.5	33.9	17.4	8.1
	36-37.5				[illegible]	99.9	99.1	97.9	96.4	95.9
	51-52.5			100.0	[illegible]	97.1	88.7	60.9	16.8	11.5
	65-66.5		100.0	[illegible]	[illegible]	56.4	45.4	40.4	24.3	19.2

The soil samples used for these tests were extracted with a 1-1/2 inch nominal inside [illegible] meter sample spoon.

The test method used for these grain size analyses conforms to ASTM Designation D422 as modified by the Soil Mechanics Bureau Soil Test Method STM-2, August 1974.

rom a barge
t mean high water.

SYMBOLS

DRILL HOLE
OBSERVED WATER LEVEL

Pavement Material and Cobblestones.

Compact Brown Gravelly Sand.
(Possible Fill Material)

Very Soft Black Muck.

Loose Brown Gravelly Sand with Occasional Boulders.
(Possible Fill Material)

Soft Grey Organic Silt with Shells.

Medium Compact Grey Silt and
Grey Sandy Silt with Occasional Boulders.

Compact to Very Compact Brown Sand and Grey
Sandy Silt and Grey Silty Sand with Boulders
and Occasional Gravel.

BOULDERS
LEDGEROCK

ROVED 1/30, 1984
W. P. Woody
ACS
DIRECTOR
OIL MECHANICS BUREAU

SION NO. 11
INTY QUEENS
G. NO. 11 SM 0007B

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION

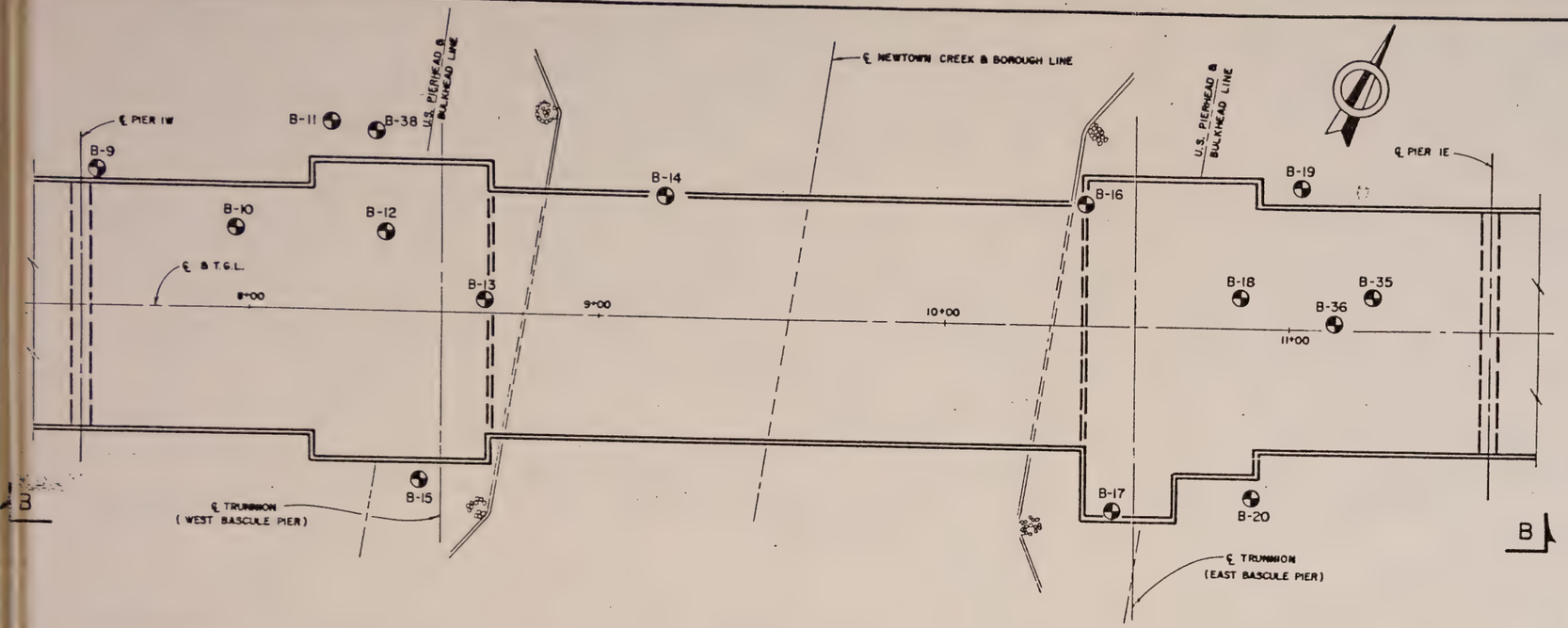
BORING LOCATION PLAN &
GENERAL SUBSURFACE PROFILE
GREENPOINT AVE. OVER NEWTOWN CREEK

DRAWING NO. 2 OF 3

FED RD REG NO	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
	NEW YORK			

GREENPOINT AVENUE BRIDGE

CAPITAL PROJECT IDENTIFICATION NUMBER: 0751.65



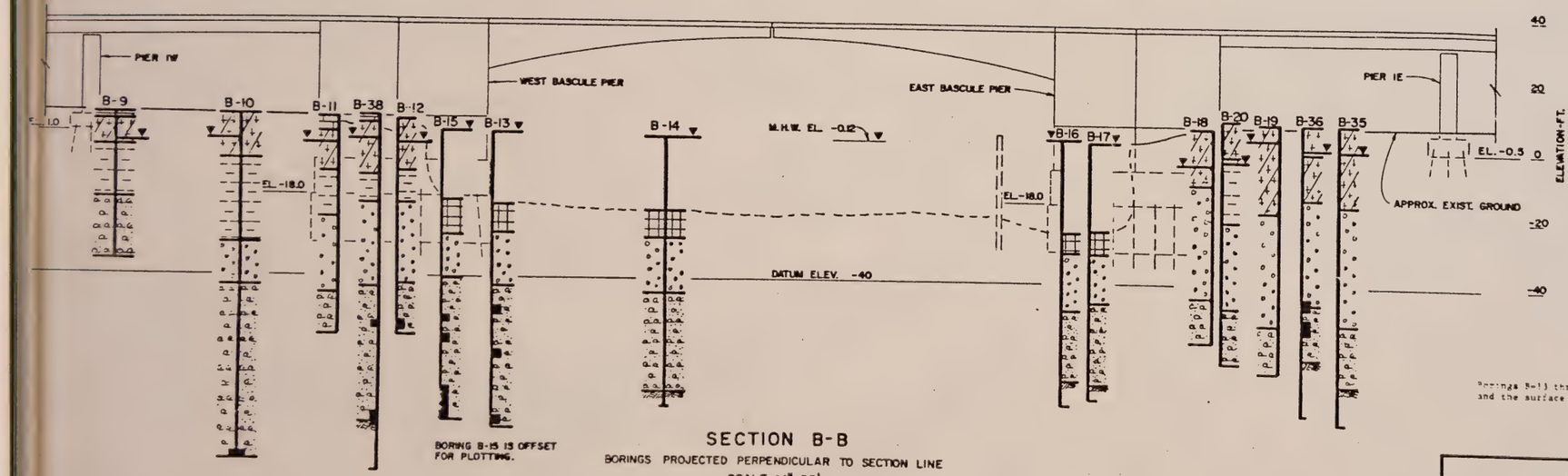
PLAN
SCALE: 1"=20'

LABORATORY GRAIN SIZE DISTRIBUTION TEST SUMMARY

Drill Hole No.	Representative Sample Depth - Feet	% Passing By Weight U.S. Std. Sieve Size								
		2"	1"	1/2"	1/4"	#10	#20	#40	#100	#200
B-11	10-11.5	100.0	86.3	[illegible]	[illegible]	66.9	57.4	[illegible]	27.3	18.7
	31-32.0	100.0	95.0	[illegible]	83.7	75.9	65.2	[illegible]	14.5	8.0
	41-42.0					100.0	99.9	[illegible]	99.6	19.2
	52-53.5			[illegible]	[illegible]	95.6	89.7	[illegible]	31.9	14.4
B-13	20-21.5			[illegible]	[illegible]	69.7	47.9	26.3	6.4	2.1
	26-27.5					100.0	100.0	99.9	99.8	99.5
	52-53.5				[illegible]	97.8	73.7	[illegible]	6.3	2.1
B-35	[illegible]		[illegible]	[illegible]	[illegible]	85.8	[illegible]	[illegible]	17.9	12.5
	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]	44.5	33.9	17.4	8.1
	[illegible]				[illegible]	99.9	99.[illegible]	[illegible]	96.4	95.9
	[illegible]			[illegible]	[illegible]	97.1	88.[illegible]	[illegible]	16.8	11.5
	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	45.[illegible]	[illegible]	24.3	19.2

1. The soil samples used for these tests were extracted with a 1-1/2 inch nominal inside [illegible] meter sample spoon.

2. The test method used for these grain size analyses conforms to ASTM Designation D42, as modified by the Soil Mechanics Bureau Soil Test Method GTM-2, August 1974.



BORING B-15 IS OFFSET FOR PLOTTING.

SECTION B-B
BORINGS PROJECTED PERPENDICULAR TO SECTION LINE
SCALE: 1"=20'

Borings B-13 through B-17 were taken from a barge and the surface elevation is assumed at mean high water.

SYMBOLS

DRILL HOLE
OBSERVED WATER LEVEL
Pavement Material and Cobblestones.
Compact Brown Gravelly Sand. (Possible Fill Material)
Very Soft Black Muck.
Loose Brown Gravelly Sand with Occasional Boulders. (Possible Fill Material)
Soft Grey Organic Silt with Shells.
Medium Compact Grey Silt and Grey Sandy Silt with Occasional Boulders.
Compact to Very Compact Brown Sand and Grey Sandy Silt and Grey Silty Sand with Boulders and Occasional Gravel.
BOULDERS
LEDGEROCK

Prepared By: R.G. Strohmaier
Drawn By: [illegible]
Dwg. Reviewed By: [illegible]
Checked By: [illegible]

APPROVED 1/30, 19[illegible]
[illegible]
DIRECTOR
SOIL MECHANICS BUREAU

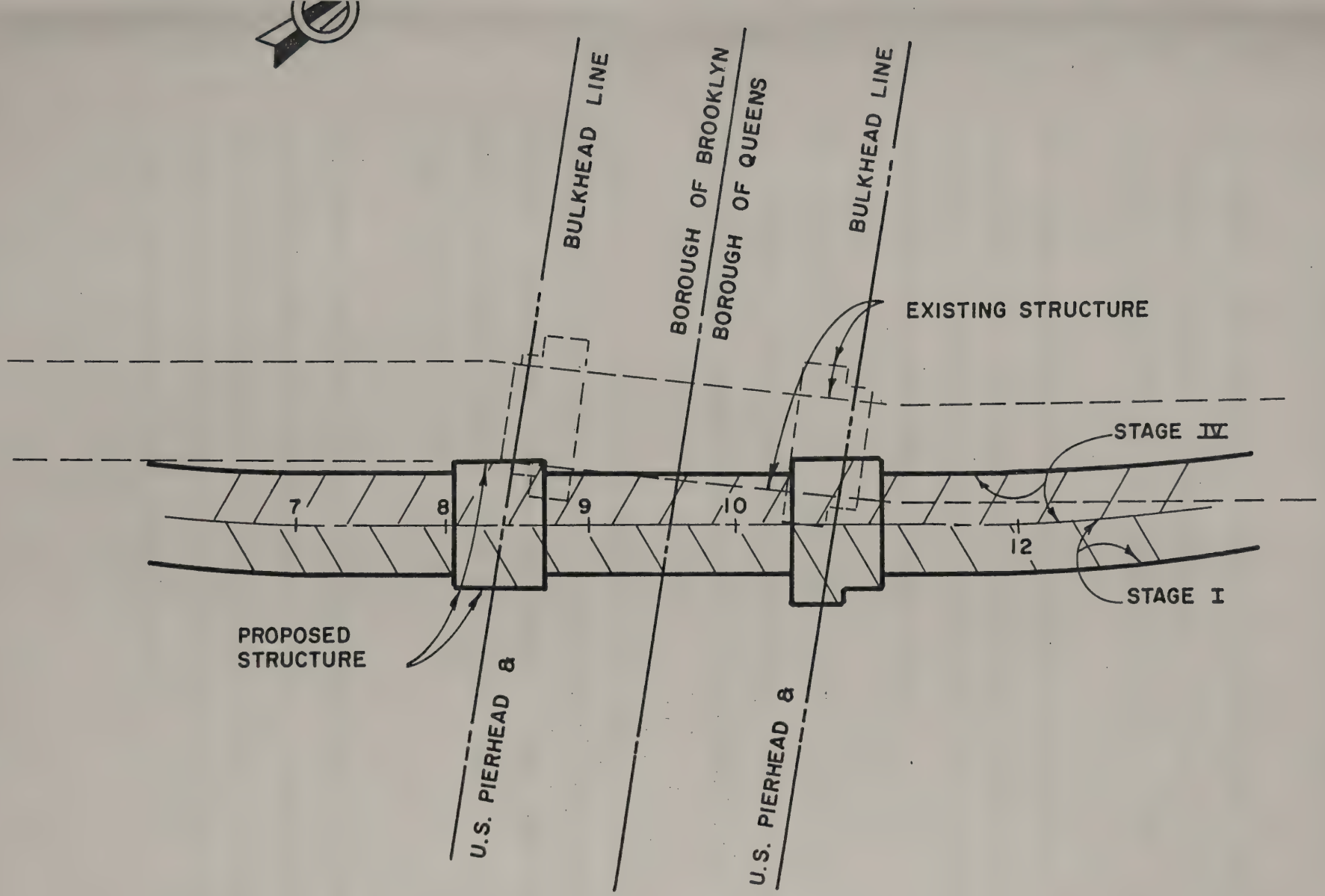
REGION NO. 11
COUNTY QUEENS
DWG. NO. 11 SM 0007B

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES DIVISION

BORING LOCATION PLAN &
GENERAL SUBSURFACE PROFILE
GREENPOINT AVE. OVER NEWTOWN CREEK

DRAWING NO. 2 OF 3

FIG. 2
SUBSURFACE PROFILE



PLAN

SCALE: 1"=100'

CONSTRUCTION STAGES

FIG. 3

CAISSON INSTALLATION PROCEDURE (STAGE I CONSTRUCTION)

The bascule pier constructed in Stage I required that a total of 53 caissons be installed. Construction began in June of 1985, and was completed several months behind schedule in November of 1986.

The original specification provided for an installation method of drilling ahead of the cutting shoe for the full depth of the caisson until the shoe was on bedrock. It also specified that a net positive head be maintained in the shell using a bentonite slurry.

No driving of the shell was to be allowed until the original structure was demolished. There were some concerns about the adverse effect of vibrations on the original structure while it was still in use.

The prime Contractor, Morrison-Knudsen-Yonkers (MKY), requested permission to use an alternate installation method which was approved by the Structures Design and Construction Division. This method involved driving the caisson shells with an MKT Diesel hammer having a rated energy of 100,000 ft. pounds.

The caisson shells were driven to a maximum resistance of 5 blows/foot and cleaned using a three step operation. First, a chisel beam was used to loosen and break up the material. Second, an air lift was inserted to remove the loosened material. Finally a Casagrande grab bucket was used to accomplish the final cleaning operation.

MKY experienced difficulty driving the shells through undisturbed material. Several casings were damaged during driving. Three casings were so badly damaged that an internal inspection had to be performed using a video camera lowered into the damaged casings. One caisson was rejected and another was installed as close as possible to the rejected one. The other two caissons were judged structurally acceptable.

This method of installation also made it difficult to completely clean the shell out before driving was resumed. To eliminate these problems MKY proposed a method of installation using a vibratory hammer (ICE Model 812). The State would not allow use of the vibratory hammer unless the Contractor installed instrumentation to monitor and ensure the integrity of the existing structure, at no cost to the State. The Contractor chose not to install the instrumentation and therefore was not allowed to use the vibratory hammer.

The rock sockets for these caissons were progressed in the same manner for both Stage I and Stage IV. A detailed discussion is included in the Stage IV installation procedure.

CAISSON INSTALLATION PROCEDURE (STAGE IV CONSTRUCTION)

Stage IV construction consisted of completing the south section of the new structure. For Stage IV construction, the prime Contractor (MKY) sub-contracted the bascule caisson installation to Franki Pile Foundations. They used the following installation method.

The caisson shells were set into place using a 100 ton crawler crane. All shells were driven with a 7000 pound caisson drop hammer with a two foot drop (Photo 1 and 2). A criterion of 5 blows/inch was established as a guideline for maximum penetration without overstressing the shells. When this set was achieved, the overburden inside the casing was loosened with a 42 ton churn drill. The churn drill bits were 33 inch diameter star drill configurations (Photo 5 and 6). The drilling was progressed 3 to 5 feet below the cutting shoe and the cuttings were removed with a bailer or sand pump to the tip elevation (Photos 7 and 8). Driving operations were then resumed. This process was continued until the caisson was seated on bedrock. The approximate caisson lengths were 80± feet on the west side and 60± feet on the east side.

Rock socket installations were identical in this stage as in Stage I. After seating the cutting shoe attached to the caisson, a pilot boring was progressed so that the Engineering Geologist could evaluate each rock core and determine the depth of the rock socket. Once this was done, 30 inch diameter rock sockets were drilled with 42 ton churn drills using drill bits weighing approximately 7000 pounds. (Photo 9).

The steel rebar cages were fabricated at the construction site and lowered to the bottom of the rock socket and centered in the caisson. (See Photos 3 and 4).

There were 35 caissons installed in this stage and 14 were inspected using video equipment for the full length of the caisson. Based on these inspections all 35 caissons were judged to be acceptable installations.

These inspections were to ensure proper cleaning and seating of each caisson and to determine that no major collapsing of the shell had taken place.

The EIC informed this writer that no major problems were encountered during this stage. This is due primarily to the Contractor's decision to drill ahead of the caisson shells thus enabling it to be advanced using a lower driving energy.

CONCLUSIONS

Several conclusions can be drawn from the Stage I and Stage IV installations:

1. The most evident conclusion drawn from this project is that the Stage IV caisson installation was a more efficient and smoother operation than the methods used in Stage I. Franki Pile Foundation's knowledge and experience with caisson construction and the use of proper equipment were quite evident.

2. A prequalification requirement should be included in the specification so that a subcontractor who is familiar with caisson installation procedures, such as Franki Pile Foundations, will perform the required work. This should insure that an acceptable product will be provided prior to any work commencing and would eliminate construction slow downs caused by alternate construction proposals advanced by inexperienced contractors.

3. Since the caissons were designed for end bearing only, our specification requiring drilling ahead of the caisson during installation in compact or bouldery soils to prevent damage to the shells should not have been compromised.

4. On this project, or any similar project where stage construction is necessary, the specification should preclude the use of vibratory equipment where any existing structure or building may

be in jeopardy without incorporating some type of vibration monitoring program in the contract. On this project, MKY requested our approval to use vibratory equipment and the State had to prepare a monitoring program during construction which ultimately was abandoned. Preparation of this program required extra time and cost to the State and an unneeded delay to the Contractor. (See Stage 1 Construction Procedure).

ITEM 11551.1236 - STEEL SHELL DRILLED CAISSONS - 36" DIAMETER

DESCRIPTION. The work shall consist of furnishing and installing drilled, steel shelled, concrete filled caissons at the locations indicated on the Plans.

MATERIALS. Materials used for this work shall conform to the following requirements:

Steel. Steel shells shall meet the requirements of subsection 715-01, ASTM Designation A252 - Grade 2. Shells shall be seamless. All shells shall be equipped with a cutting shoe acceptable to the D.C.E.S.

Reinforcing Steel. This shall meet the requirements of subsection 709-04, Epoxy-Coated Bar Reinforcement.

Concrete. The requirements of Section 501 shall apply.

Concrete shall be Class G.

CONSTRUCTION DETAILS.

Steel Shell Installation. Equipment used for this work shall be the responsibility of the Contractor.

The method of installation shall be as follows:

Drill, or auger, in advance of each shell as it is being progressed, to remove all soil and other obstructions from the proposed path, until the cutting shoe is in contact with bedrock. A net positive head shall be maintained at all times using drilling mud.

Driving of the steel shells will be permitted after the existing structure has been demolished.

Splices will be allowed only if specifically permitted by the D.C.E.S. and at locations approved by him. Only one splice per pile will be allowed. Splices shall be made in the manner detailed on the Contract Plans.

After the shell has been progressed to the point that the cutting shoe is in contact with bedrock, all materials inside will be completely cleaned out. The cutting edge shall then be seated firmly into sound rock for a depth of at least six (6) inches. After the cutting edge has been seated, a rock socket shall be drilled into the bedrock.

Drilled-in rock sockets shall be a minimum of 30 inches in diameter and shall extend to a depth of at least four (4) feet below the cutting shoe.

The depth of the rock sockets will be based upon pilot borings extending a minimum of ten feet into sound rock. Borings will be taken at the locations indicated on the Plans. The actual depth of each rock socket will be determined by the D.C.E.S. or his designated representative. The D.C.E.S. will render this determination five working days after the receipt of all pertinent information. The Contractor's attention is directed to the Special Notes which pertain to pilot borings which shall be drilled in accordance with the requirements for Item No. 648.22 - Rock Core Drilling NX Cores 2 1/8" Minimum Diameter.

After the rock socket has been drilled, socket and shell shall be thoroughly cleaned and inspected. Any evidence of misalignment greater than three inches from the Plan location or of distortion shall be reported to the D.C.E.S. who will make a determination as to the corrective measures, if any, to be taken. All corrective measures ordered by the D.C.E.S. will be done at no additional expense to the State.

Bar reinforcement shall then be placed and secured such that it will occupy its proper position within the concrete fill.

After obtaining approval from the Engineer concrete placement may begin. Placement shall be such that segregation of the mix is avoided. Under no circumstances will concrete be permitted to be dumped freely into the shell. Special care shall be exercised during placement to prevent honeycombs and air pockets from forming. Precise volumetric records shall be kept for the filling of each shell to verify the proper placement of concrete. Internal vibrators, and other means acceptable to the Engineer, shall be used to consolidate the concrete. Internal vibrators, and other means, shall be used to the depth deemed practical by the Engineer.

Concrete shall be placed in accordance with the requirements of Section 555.

Completely installed caissons shall vary not more than 2% from the vertical or from the angle of batter indicated on the Plans. They shall not vary from the plan location by more than three (3) inches in any direction. Should this provision be violated the D.C.E.S. shall be informed.

METHOD OF MEASUREMENT. Measurement will be made as the number of linear feet of steel shell drilled caissons installed. Measurement will be taken along the centerline of the caissons from the top of cut-off elevation to the bottom of rock socket, before the concrete fill is placed.

BASIS OF PAYMENT. The unit price bid per linear foot shall include the cost of all labor, materials and equipment necessary to complete the work including splicing, and cutting off surplus shell lengths. No payment will be authorized until after the shell has been filled completely with concrete.

Epoxy-Coated Bar Reinforcement will be paid for under its respective item.

Pilot borings for rock sockets will be paid for under Item No. 648.22 - Rock Core Drilling NX Cores 2 1/8" Minimum Diameter.

No payment will be made for work specifically excluded from payment by the terms of this item.

648-1 DESCRIPTION. This work shall consist of drilling for soil and rock samples and recording boring log data as specified. The various sampling methods are designated as follows:

Split Barrel Sampling — Driven soil samples
Thin-Walled Tube Sampling — Undisturbed soil samples
Rock Core Sampling

648-2 MATERIALS. Materials for this work shall meet the requirements of the following subsections of

Boulder and Rock Core Boxes 732-10

648-3 CONSTRUCTION DETAILS

648-3.01 Drilling Procedures.

B. Rock Samples. Continuous rock core samples shall be taken in boulders exceeding six inches in penetration thickness and in ledge rock at locations and depths designated by the Engineer. Rock samples shall be drilled with a Double Tube, Swivel Type Core Barrel using a diamond bit that will drill a rock core not less than 1 1/8 inches in diameter in 2 1/2 inch casing and 2 1/8 inches in diameter for 4 inch casing. If, in the judgement of the Engineer, a satisfactory core is not recovered, a Series M Double Tube Core Barrel or approved equal and short "runs" may be required.

648-3.02 Sampling.

C. Rock Cores. Core recoveries of less than 85% will generally not be considered satisfactory. Except for deliberately serving the continuous core, care shall be taken to avoid blocking the bit or core barrel.

When the core is broken off, the core barrel shall be raised to the ground surface and the core withdrawn.

648-3.03 Boring Log Data. Data obtained in borings shall be recorded in the field and shall include the following:

C. Rock Samples. Samples shall be labeled in accordance with "Instructions for Labeling Rock Cores" as shown on Soils Bureau Drawing No. SM1694. This information is available upon request to the Department's Soil Mechanics Bureau.

The rock cores shall be placed for shipment in "Boulder and Rock Core Boxes" meeting the requirements of §732-10.

648-3.04 Ground Water Levels. The level at which ground water is first encountered in the borings shall be noted. When water is introduced in the hole, water level readings shall be taken at the end of each day after the hole is prepared to the next sampling depth. The casing or drive pipe shall be filled with water and covered at the end of the working day and the drop, if any, recorded when the work is resumed. Ground water levels shall be measured before and after the casing or drive pipe is pulled. Each water level reading shall be recorded showing the date and time the reading is made, the depth of the drive pipe or casing, and the depth to water. Any loss or gain of water in the boring, except that caused by deliberately introducing water and/or inserting or removing tools shall be recorded. This record shall show the date and time the loss or gain is noted, the depth of the casing and the depth to water. If flowing, the height of artesian rise above the ground surface shall be recorded.

All water level readings and related data shall be recorded on the borings logs under "Remarks." If necessary, addtional forms shall be used for recording ground water data.

Artesian heads shall be effectively and permanently sealed. This seal shall be satisfactory to the Engineer.

648-3.05 Marking and Packaging Samples.

C. Rock Samples. Samples shall be labeled in accordance with "Instructions for Labeling Rock Cores" as shown on Soils Bureau Drawing No. SM1694. This information is available upon request to the Department's Soil Mechanics Bureau.

The rock cores shall be placed for shipment in "Boulder and Rock Core Boxes" meeting the requirements of §732-10.

648-3.06 Delivery of Samples.

B. Rock Samples. Samples shall be delivered to the New York Regional Office which is delegated the responsibility and authority to execute the prescribed work.

648-3.07 Furnishing Equipment for Making Borings. The Contractor shall furnish the number of drill rigs stated in the proposal. The rigs shall be supplemented with the necessary auxiliaries, appurtenances, tools and other equipment. All equipment shall be acceptable to the Engineer.

648-4 METHOD OF MEASUREMENT

648-4.03 Rock Core Drilling. The quanities to be paid for shall be the actual number of linear feet drilled as measured in the presence of the Engineer or Inspector and as substantiated by core length obtained, property labeled, described and boxed.

648-4.04 Furnishing Equipment for Making Borings. The quantities to be paid for shall be the number of drill rigs specified in the proposal and for additional rigs ordered on the project by the Engineer. Payment will not be made for any drill rig that does not work at least 75 percent of the total working time computed from the date of actual commencement of the work to the final completion date.

648-5 BASIS OF PAYMENT

648-5.03 Rock Core Drilling. The unit price bid per linear foot shall include the cost of furnishing all labor, materials and equipment necessary to complete the work including core boxes which shall become the property of the State. Furnishing boring equipment will be paid for separately.

648-5.04 Furnishing Equipment for Makings Borings. The unit price bid for each drill rig shall include the cost of furnishing all labor, materials and equipment necessary for transporting, erecting, maintaining, making any ordered equipment replacement, dismantling and removing the boring equipment. The cost of all labor, including the manipulation of the boring equipment and materials in connection with making borings shall be included in the unit price bid for the respective sampling items.

Payment will be made under:

Item No.	Item	Pay Unit
648.22	Rock Core Drilling NX Cores 2 1/8" Min. Diam.	Linear Foot
648.23	Furnishing Equipment for Making Borings	Each

CONTRACT NUMBER D500026

BIDDER NUM	BIDDER RANK	BIDDER NAME
1	A	MORRISON KNUDSEN&YONKERS CONTR CO
2	B	MERGENTIME CORPORATION
3	C	CLARK-FITZPATRICK INCORPORATED
4	D	SLATTERY ASSOCIATES INC
5	E	CONDUIT&FOUNDATION CORPORATION
6	F	NORTHSTAR CONTR CORP&TERN-STAR J V
7	G	STEERS BUCKLEY CORBETTA SPEARIN
8	H	SCHIAVONE CONSTRUCTION CO INC
9	I	DEFOE CORP&KOCH ERECT CO INC J V
10	J	A J PEGNO CONSTRUCTION CORP
11	K	PETRACCA&SONS INC

ITEM	QUANTITY	BIDDER A	BIDDER B	BIDDER C	BIDDER D	BIDDER E	BIDDER F	BIDDER G
201.0601	100%LS	150,000.000	10,000.000	337,454.000	250,000.000	150,000.000	200,000.000	1,000.000
11202.17	100%LS	2,700,000.000	1,100,000.000	2,200,000.000	2,000,000.000	2,000,000.000	2,100,000.000	2,000,000.000
202.20	40.00	9.000	20.000	15.000	25.000	50.000	4.000	10.000
203.02	28,300.00	20.000	12.000	15.000	10.000	17.000	10.000	15.000
203.03	4,477.00	19.000	8.000	15.000	10.000	7.000	7.000	8.000
203.07	3,967.00	27.000	30.000	25.000	20.000	25.000	24.000	33.000
203.21	2,700.00	33.000	20.000	40.000	3.000	30.000	20.000	30.000
17203.9501	112.00	1.500	1.500	2.000	5.000	5.000	10.000	2.000
206.01	4,000.00	14.000	35.000	15.000	25.000	17.000	20.000	20.000
206.02	1,853.00	41.000	43.000	18.000	30.000	10.000	15.000	16.000
10206.0301	1,006.00	6.000	6.000	2.000	5.000	6.000	5.000	8.000
11206.0399	100%LS	15,000.000	100,000.000	200,000.000	800,000.000	42,000.000	100,000.000	60,000.000
15304.0107	8,200.00	35.000	25.000	25.000	30.000	35.000	35.000	28.000
10403.0903	576.00	6.000	5.000	5.000	5.000	5.000	5.000	4.000
403.13	1,990.00	65.000	75.000	66.000	70.000	75.000	66.000	50.000
403.1701	1,990.00	68.000	75.000	66.000	70.000	75.000	84.000	50.000
407.0101	1,206.00	3.000	5.000	9.000	5.000	2.000	7.000	2.000
15502.4510	112.00	75.000	29.000	10.000	50.000	30.000	30.000	50.000
603.0101	4,542.00	115.000	150.000	100.000	125.000	150.000	150.000	120.000
551.0201	900.00	35.000	74.000	35.000	100.000	80.000	35.000	60.000
551.0203	124.00	40.000	77.000	36.000	100.000	140.000	50.000	70.000
551.04	12,650.00	16.000	20.000	20.000	15.000	25.000	15.000	15.000
11551.040103	12.00	900.000	690.000	2,000.000	1,000.000	2,000.000	1,500.000	2,000.000
11551.040119	8.00	2,700.000	4,200.000	6,000.000	3,000.000	10,000.000	4,000.000	7,000.000
551.0501	22,627.00	23.000	36.000	22.000	30.000	35.000	25.000	20.000
551.0503	2,491.00	27.000	40.000	25.000	25.000	40.000	28.000	27.000
551.0801	144.00	100.000	80.000	250.000	150.000	180.000	120.000	300.000

LETTING DATE 8/30/84

NYS DEPARTMENT OF TRANSPORTATION
CONTRACTS BUREAU - SPREAD REPORT - BID REPORT PROGRAM - J502000
EEHS PIN 075165
CONTRACT NUMBER D500026

ITEM	QUANTITY	BIDDER A	BIDDER B	BIDDER C	BIDDER D	BIDDER E	BIDDER F	BIDDER G
551.0803	17.00	100.000	80.000	250.000	150.000	200.000	140.000	200.000
551.09	100%LS	88,000,000	400,000,000	50,000,000	500,000,000	150,000,000	200,000,000	150,000,000
11551.1238	5,280.00	295.000	170.000	350.000	100.000	380.000	300.000	400.000
552.04	62,400.00	6.000	12.000	7.000	5.000	9.000	9.000	6.000
552.0601	23,725.00	28.000	12.000	20.000	20.000	30.000	17.000	12.000
552.0602	38,750.00	30.000	50.000	25.000	30.000	60.000	40.000	40.000
11552.95	200.00	2,650.000	2,370.000	1,500.000	2,000.000	2,000.000	2,000.000	3,000.000
553.03	30.00	4,800.000	6,000.000	4,000.000	3,000.000	3,500.000	6,000.000	5,500.000
555.01	8,582.00	185.000	260.000	200.000	300.000	300.000	500.000	300.000
555.0201	1,586.00	325.000	430.000	375.000	400.000	400.000	500.000	500.000
555.0202	2,159.00	144.000	240.000	150.000	200.000	250.000	500.000	220.000
555.0403	61,796.00	12.500	14.000	12.000	15.000	15.000	7.000	21.000
555.0404	5,969.00	7.000	8.000	10.000	5.000	10.000	7.000	10.000
555.06	5,593.00	120.000	140.000	125.000	200.000	180.000	500.000	140.000
11555.3520	12,733.00	32.000	15.000	30.000	25.000	30.000	34.000	15.000
16555.6602	52,300.00	1.500	1.000	1.000	1.000	0.700	0.750	0.750
11555.9601	729.00	195.000	200.000	175.000	250.000	400.000	210.000	500.000
556.0202	2,198,274.00	0.750	0.750	1.000	1.000	1.000	0.900	1.000
556.03	23,562.00	2.000	2.000	5.000	1.500	1.500	1.600	4.000
559.01	4,424.00	2.000	3.000	1.500	2.000	3.000	2.000	3.000
11560.98	3,110.00	65.000	49.000	60.000	45.000	60.000	66.000	50.000
564.0501	100%LS	2,500,000.000	2,300,000.000	3,200,000.000	2,531,500.000	2,000,000.000	2,700,000.000	3,500,000.000
564.0502	100%LS	3,900,000.000	4,800,000.000	6,900,000.000	5,761,000.000	4,700,000.000	5,350,000.000	6,000,000.000
565.1301	24.00	900.000	1,000.000	1,000.000	1,200.000	1,000.000	1,000.000	1,000.000
565.1302	2.00	1,100.000	1,500.000	1,100.000	1,600.000	1,200.000	1,300.000	1,700.000
565.1501	126.00	1,300.000	700.000	1,300.000	1,100.000	800.000	750.000	1,500.000
565.1504	28.00	1,800.000	1,200.000	1,700.000	1,700.000	1,200.000	1,280.000	2,600.000
565.1701	14.00	1,100.000	700.000	900.000	1,000.000	600.000	600.000	1,500.000
565.1704	28.00	1,450.000	1,200.000	1,100.000	1,500.000	1,100.000	1,100.000	2,350.000
565.1707	1.00	1,750.000	2,000.000	2,100.000	2,000.000	1,600.000	1,500.000	3,700.000
565.1712	2.00	2,500.000	3,000.000	2,500.000	4,000.000	3,000.000	2,700.000	5,300.000
565.1716	1.00	3,000.000	4,000.000	3,500.000	5,000.000	4,000.000	4,000.000	9,600.000
11566.98	100%LS	470,000.000	400,000.000	600,000.000	620,000.000	430,000.000	500,000,000	600,000.000
566.2001	286.00	175.000	170.000	60.000	200.000	200.000	180.000	300.000
567.34	148.00	110.000	152.000	75.000	100.000	100.000	100.000	60.000
567.35	73.00	115.000	158.000	100.000	100.000	120.000	100.000	65.000
567.37	145.00	135.000	168.000	125.000	100.000	140.000	160.000	80.000
567.38	73.00	150.000	168.000	150.000	100.000	160.000	150.000	95.000
568.11	2,797.00	130.000	120.000	210.000	120.000	120.000	120.000	125.000
11569.1002	2,485.00	22.000	25.000	7.000	50.000	15.000	23.000	35.000

ITEM	QUANTITY	BIDDER A	BIDDER B	BIDDER C	BIDDER D	BIDDER E	BIDDER F	BIDDER G
11609.25	1,686.00	13.000	17.000	10.000	8.000	25.000	15.000	10.000
11609.26	5,052.00	22.000	24.000	20.000	20.000	30.000	25.000	27.000
10609.2804	21.00	13.000	15.000	10.000	20.000	50.000	30.000	28.000
610.0201	0.20	5,000.000	5,000.000	7,000.000	5,000.000	5,000.000	10,000.000	2,200.000
619.01	100%LS	50,000.000	200,000.000	25,000.000	100,000.000	500,000.000	250,000.000	150,000.000
619.02	100%LS	150,000.000	52,000.000	25,000.000	35,000.000	19,000.000	30,000.000	50,000.000
15619.0303	100%LS	33,000.000	14,000.000	50,000.000	5,000.000	60,000.000	15,000.000	20,000.000
619.0413	1,400.00	21.000	18.000	5.000	20.000	30.000	40.000	17.500
619.0502	600.00	33.000	35.000	50.000	30.000	30.000	25.000	105.000
10619.0599	220.00	4.000	35.000	50.000	30.000	35.000	25.000	90.000
619.15	18,000.00	0.200	0.500	0.600	0.500	0.150	1.000	0.300
15619.1605	60.00	125.000	100.000	500.000	100.000	300.000	100.000	600.000
11619.1691	3.00	600.000	2,640.000	500.000	2,500.000	2,500.000	500.000	4,500.000
11619.1693	2.00	2,100.000	3,675.000	500.000	3,600.000	8,300.000	2,000.000	7,500.000
619.17	3,950.00	25.000	28.000	20.000	20.000	40.000	20.000	15.000
11619.9905	2.00	1,000.000	1,000.000	1,000.000	2,500.000	1,500.000	2,000.000	500.000
623.12	201.00	60.000	24.000	25.000	35.000	50.000	40.000	32.000
630.01	185.00	55.000	20.000	60.000	20.000	50.000	80.000	30.000
633.0202	3,170.00	1.000	0.500	1.000	1.000	0.500	1.000	1.000
634.01	100%LS	400,000.000	500,000.000	400,000.000	200,000.000	500,000.000	520,000.000	500,000.000
634.03	5.00	1,200.000	1,200.000	1,500.000	1,000.000	3,000.000	1,000.000	1,500.000
15634.0604	20,000.00	5.000	10.000	1.000	1.000	0.500	1.000	1.000
637.01	1.00	6,000.000	3,500.000	20,000.000	5,000.000	5,000.000	10,000.000	20,000.000
637.09	36.00	2,000.000	1,200.000	2,000.000	1,000.000	2,500.000	1,000.000	2,500.000
648.22	11,620.00	115.000	85.000	110.000	35.000	110.000	100.000	100.000
11651.1001	1.00	2,250.000	600.000	4,000.000	1,000.000	2,500.000	2,000.000	3,000.000
11651.1101	1.00	500.000	315.000	1,000.000	500.000	1,000.000	800.000	400.000
11651.1201	100%LS	1,500.000	3,100.000	10,000.000	3,000.000	1,500.000	1,000.000	8,000.000
655.01	104.00	75.000	70.000	50.000	30.000	50.000	55.000	95.000
655.02	5.00	380.000	50.000	125.000	40.000	300.000	350.000	1,700.000
15655.03	354.00	80.000	110.000	80.000	40.000	50.000	50.000	45.000
656.01	22,704.00	4.000	1.500	5.000	6.000	2.000	6.000	6.000
11660.0105	530.00	12.000	18.000	15.000	20.000	17.000	10.000	23.000
11660.0106	2,659.00	22.000	16.000	15.000	20.000	17.000	20.000	24.000
11660.0108	235.00	27.000	21.000	20.000	20.000	22.000	25.000	33.000
11660.0110	80.00	33.000	30.000	25.000	30.000	35.000	30.000	40.000
11660.0810	2.00	1,600.000	1,700.000	1,000.000	1,500.000	2,200.000	1,500.000	1,330.000
11660.1104	24.00	2,200.000	1,600.000	1,000.000	1,600.000	1,600.000	2,000.000	1,200.000
10660.75	17.00	520.000	60.000	100.000	100.000	250.000	100.000	57.000
11661.0205	3,575.00	1.000	1.200	2.000	1.000	1.600	1.000	2.150

ITEM 648.22 - ROCK CORE DRILLING (NX CORES)

LETTING DATE 8/30/04

NYS DEPARTMENT OF TRANSPORTATION
CONTRACTS BUREAU - SPREAD REPORT - BID REPORT PROGRAM - J502000
EEHS PIN 075165
CONTRACT NUMBER D500026

ITEM	QUANTITY	BIDDER A	BIDDER B	BIDDER C	BIDDER D	BIDDER E	BIDDER F	BIDDER G
680.8225	3.00	160.000	360.000	500.000	400.000	300.000	150.000	270.000
11680.8302	970.00	16.000	14.000	14.000	14.000	12.000	15.000	23.000
11680.8307	5.00	1,010.000	650.000	200.000	700.000	1,400.000	1,000.000	610.000
11680.8308	8.00	3,100.000	2,900.000	500.000	3,000.000	3,500.000	3,000.000	3,400.000
18685.060101	3,628.00	1.000	0.500	4.000	1.000	0.200	1.000	1.500
18685.060201	4,822.00	1.000	0.500	4.000	1.000	0.200	1.000	2.000
18688.0102	3,120.00	1.000	1.250	1.500	1.000	1.000	1.500	2.000
18688.0302	2.00	100.000	40.000	75.000	100.000	100.000	100.000	100.000
18688.0402	1.00	100.000	40.000	100.000	100.000	100.000	100.000	200.000
15699.0002	100%LS	100.000	100.000	100.000	100.000	100.000	100.000	100.000
15699.0012	100%LS	100.000	100.000	100.000	100.000	100.000	100.000	100.000
699.01	100%LS	938,597.190	900,000.000	400,000.000	950,000.000	1,000,000.000	1,100,000.000	1,150,000.000
COMPUTED TOTAL		32,225,170.19	33,679,961.50	34,171,883.00	34,380,394.00	36,850,464.00	39,258,030.30	39,574,264.25
SUM OF BIDDERS EXTENSIONS		32,246,573.00	33,679,961.50	34,171,883.00	34,380,394.00	36,850,464.00	39,268,030.30	39,574,264.00
+ DIFFERENCE		21,402.81					10,000.00	0.25
- DIFFERENCE			0.00	0.00	0.00	0.00		
ANNOUNCED BID		32,246,573.00	33,679,961.50	34,171,583.00	34,381,000.00	36,850,464.00	39,268,030.30	39,574,264.00

ITEM	QUANTITY	BIDDER H	BIDDER I	BIDDER J	BIDDER K
201.0601	100%LS	20,000.000	20,000.000	100,000.000	150,000.000
11202.17	100%LS	4,000,000.000	4,000,000.000	4,474,500.000	4,800,000.000
202.20	40.00	15.000	15.000	10.000	15.000
203.02	28,300.00	15.000	30.000	30.000	20.000
203.03	4,477.00	12.000	25.000	8.000	30.000
203.07	3,967.00	21.000	25.000	20.000	25.000
203.21	2,700.00	21.000	18.000	20.000	30.000
17203.9501	112.00	5.000	5.000	1.000	2.000
206.01	4,000.00	25.000	30.000	30.000	40.000
206.02	1,853.00	25.000	30.000	30.000	40.000
10206.0301	1,005.00	10.000	5.000	10.000	12.000
11206.0399	100%LS	180,000.000	50,000.000	200,000.000	150,000.000
15304.0107	5,200.00	33.000	32.000	30.000	45.000
10403.0903	576.00	3.000	5.000	2.000	5.000
403.13	1,990.00	60.000	55.000	80.000	75.000
403.1701	1,990.00	60.000	60.000	80.000	100.000
407.0101	1,206.00	4.000	3.000	1.000	3.000
15502.4510	112.00	50.000	30.000	60.000	20.000
503.0101	4,542.00	180.000	100.000	140.000	110.000
551.0201	900.00	31.000	60.000	35.000	25.000
551.0203	124.00	36.000	30.000	40.000	26.000
551.04	12,650.00	17.000	25.000	15.000	20.000
11551.040103	12.00	3,000.000	3,000.000	1,500.000	1,000.000
11551.040119	8.00	8,500.000	9,000.000	8,000.000	7,000.000
551.0501	22,627.00	21.000	25.000	20.000	20.000
551.0503	2,491.00	24.000	30.000	22.000	26.000
551.0801	144.00	100.000	220.000	55.000	80.000
551.0803	17.00	100.000	220.000	65.000	110.000
551.09	100%LS	100,000.000	150,000.000	100,000.000	160,000.000
11551.1236	5,280.00	550.000	500.000	500.000	450.000
552.04	52,400.00	6.000	19.000	12.000	5.000
552.0601	23,725.00	5.000	23.000	20.000	15.000
552.0602	38,750.00	20.000	45.000	40.000	100.000
11552.95	200.00	4,000.000	3,000.000	3,000.000	3,500.000
553.03	30.00	8,000.000	5,500.000	6,000.000	8,000.000
555.01	8,582.00	220.000	150.000	300.000	400.000
555.0201	1,586.00	330.000	200.000	420.000	450.000
555.0202	2,159.00	250.000	180.000	250.000	250.000
555.0403	61,796.00	20.000	12.000	10.000	12.000

NYS DEPARTMENT OF TRANSPORTATION
CONTRACTS BUREAU - SPREAD REPORT - BID REPORT PROGRAM - J502000
EEIS PIN 075165
CONTRACT NUMBER D500026

ITEM	QUANTITY	BIDDER H	BIDDER I	BIDDER J	BIDDER K
11619.1691	3.00	2,640.000	1,500.000	600.000	350.000
11619.1693	2.00	3,700.000	2,100.000	700.000	400.000
619.17	3,950.00	30.000	23.000	35.000	20.000
11619.9905	2.00	1,000.000	500.000	500.000	300.000
623.12	201.00	40.000	40.000	40.000	60.000
630.01	185.00	50.000	50.000	50.000	50.000
633.0202	3,170.00	0.700	2.000	1.000	0.300
634.01	100%LS	600,000.000	100,000.000	400,000.000	600,000.000
634.03	5.00	1,200.000	1,200.000	1,100.000	1,500.000
18634.0604	20,000.00	1.000	1.000	7.000	5.000
637.01	1.00	12,000.000	3,000.000	1,500.000	15,000.000
637.09	36.00	2,200.000	3,500.000	2,500.000	3,000.000
648.22	1,620.00	30.000	100.000	100.000	24.000
11651.1001	1.00	600.000	650.000	1,300.000	1,000.000
11651.1101	1.00	300.000	500.000	600.000	300.000
11651.1201	100%LS	3,100.000	2,000.000	5,000.000	1,000.000
655.01	104.00	45.000	60.000	40.000	50.000
655.02	5.00	500.000	300.000	400.000	400.000
15655.03	354.00	50.000	35.000	50.000	60.000
656.01	22,704.00	5.000	10.000	6.000	10.000
11660.0105	530.00	20.000	17.000	22.000	12.000
11660.0106	2,659.00	16.000	16.000	24.000	13.000
11660.0108	235.00	18.000	22.000	32.000	19.000
11660.0110	80.00	30.000	29.000	40.000	23.000
11660.0810	2.00	1,700.000	1,800.000	1,400.000	1,200.000
11660.1104	24.00	1,600.000	1,300.000	1,300.000	1,000.000
10660.75	17.00	60.000	50.000	70.000	30.000
11661.0205	3,575.00	1.200	2.000	3.000	1.000
11661.0302	3,700.00	1.200	1.000	2.000	1.000
11661.0305	1,160.00	1.200	1.500	2.500	1.000
11661.0307	13,220.00	1.500	2.000	2.500	1.000
11661.2503	2.00	8,000.000	10,000.000	15,000.000	12,300.000
11661.3408	10.00	160.000	500.000	900.000	900.000
11663.0102	192.00	40.000	35.000	70.000	60.000
11663.0105	323.00	70.000	70.000	80.000	100.000
11663.2001	4.00	1,000.000	2,300.000	300.000	2,000.000
11663.2010	10.00	200.000	300.000	200.000	500.000
11663.2101	3.00	1,200.000	2,500.000	900.000	1,000.000
11663.2201	3.00	400.000	800.000	250.000	300.000
11663.2808	2.00	400.000	1,000.000	300.000	600.000

LETTING DATE 8/30/84

NYS DEPARTMENT OF TRANSPORTATION
CONTRACTS BUREAU - SPREAD REPORT - BID REPORT PROGRAM - U502000
EEHS PIN 0"5165
CONTRACT NUMBER D500026

ITEM	QUANTITY	BIDDER H	BIDDER I	BIDDER J	BIDDER K
COMPUTED TOTAL		40,616,873.23	41,933,102.00	42,459,103.80	43,542,439.60
SUM OF BIDDERS EXTENSIONS		40,633,857.50	41,933,102.00	42,469,903.80	43,542,439.60
+ DIFFERENCE		16,984.27		10,800.00	
- DIFFERENCE			0.00		0.00
ANNOUNCED BID		40,633,857.50	41,933,102.00	42,469,903.80	43,542,439.60

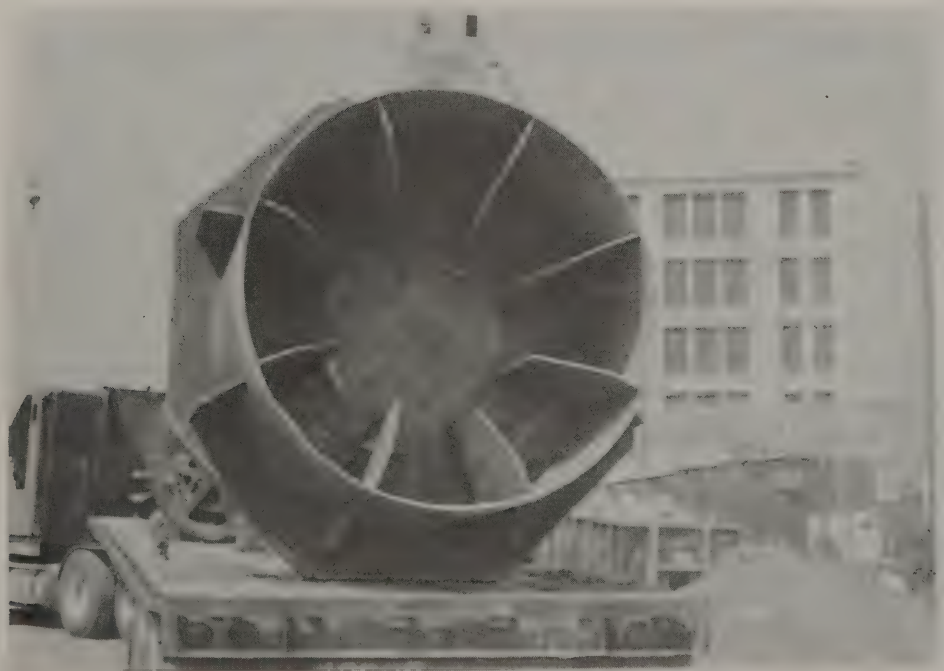
I HEREBY CERTIFY THAT THIS TABULATION
INCLUDES ALL BIDS RECEIVED AT A PUBLIC LETTING
HELD AT ALBANY, N.Y. ON 8/30/84 FOR A
CONTRACT IN KINGS COUNTY, KNOWN AS
D500026

DATE 9/4/84

DIRECTOR, CONTRACTS BUREAU

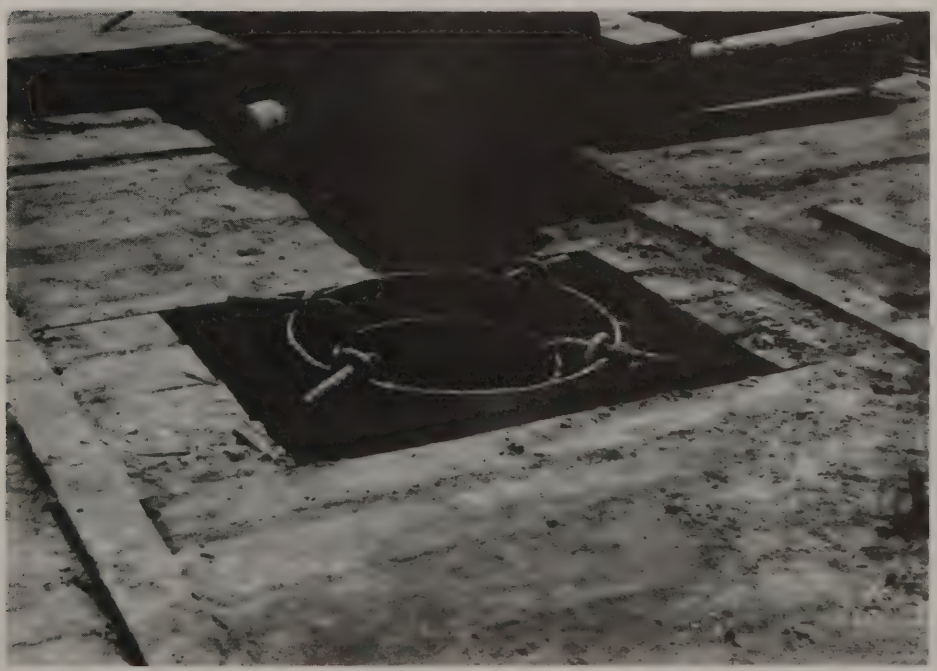
A-12

1 DROP HAMMER USED IN (STAGE IV) CAISSON INSTALLATION (SIDE VIEW)



2 END VIEW OF SAME HAMMER

3 JIG USED TO CONSTRUCT REBAR CAGE USED IN CAISSONS



4 REBAR CAGE INSTALLED IN DRIVEN AND SEATED CAISSON

JIG MANUFACTURED BY FRANKI PILE (STAGE

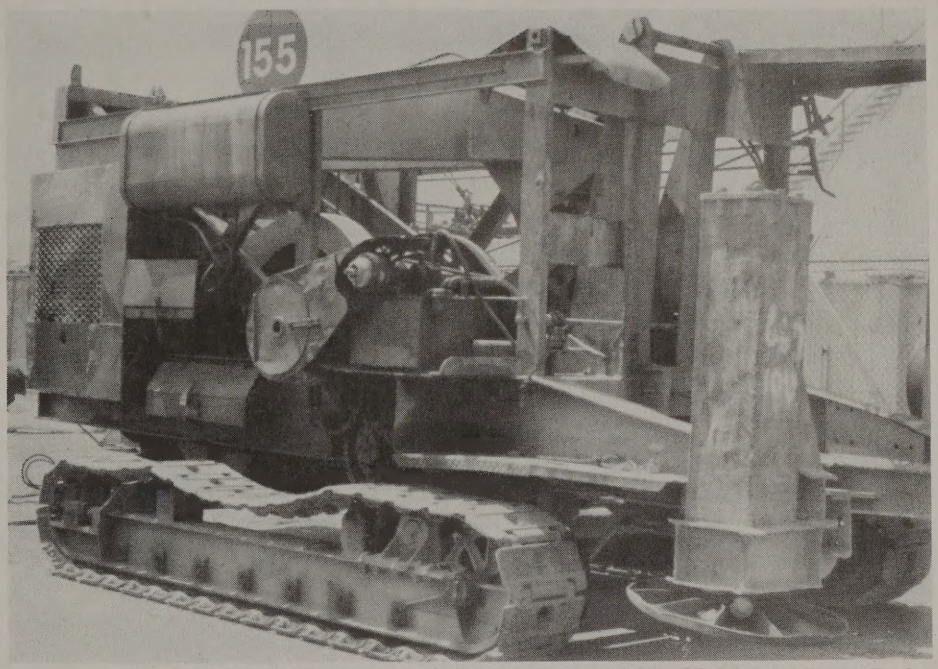
IV) CONTRACTOR TO SHARPEN CHURN DRILL

6 ANOTHER VIEW OF SAME CHURN DRILL

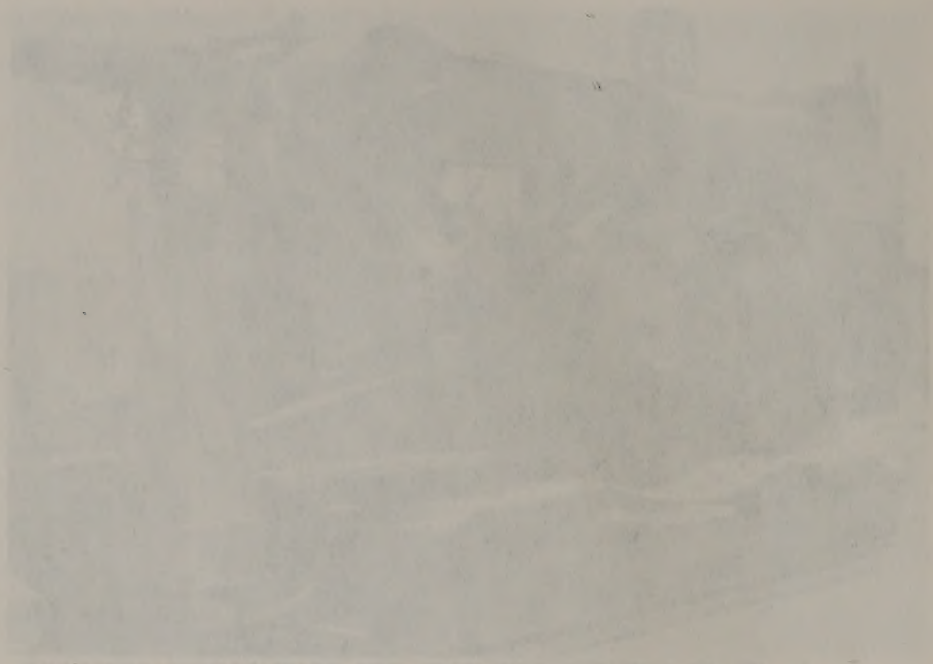
SHARPENING EQUIPMENT

7 BAILER USED TO CLEAN OUT CASING (USED IN CLAY MATERIAL)

8 PIPES USED IN SAND PUMP CAISSON CLEANING OPERATION



9 TRACK MOUNTED RIG USED FOR ROCK SOCKET DRILLING



00012
LRI